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<b>(21) International Application Number:</b> PCT/US96/12195 <b>(22) International Filing Date:</b> 31 July 1996 (31.07.96)  <b>(30) Priority Data:</b> 08/509,303                      31 July 1995 (31.07.95)                      US  <b>(71) Applicant:</b> BUSH BOAKE ALLEN INC. [US/US]; 7 Mercedes Drive, Montvale, NJ 07645 (US).  <b>(72) Inventors:</b> BRADY, Eileen; 149 Third Avenue, Westwood, NJ 07675 (US). MANKOO, Amrit, Singh; RD #2, Box 170, New Hampton, NY 10958 (US). MONTENEGRO, Aurora, Manganon; 2 Hawk Street, Chestnut Ridge, NY 10977 (US).  <b>(74) Agent:</b> FIELDS, Beth, Kovitz; 22 Birch Brook Road, Cortlandt Manor, NY 10566 (US).		<b>(81) Designated States:</b> AU, BR, CA, JP, MX, European patent (AT, BE, CH, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE).  <b>Published</b> <i>With international search report.</i>
<b>(54) Title:</b> TASTE MASKING OF THYMOL  <b>(57) Abstract</b>  A composition containing at least one sweet and herbaceous aromatic compound, at least one compound that provides cooling, vapor action, and at least one warm, sweet, fruity compound that inhibits bitterness for masking the taste of thymol in an organoleptic product containing thymol is provided. In a preferred embodiment, the sweet and herbaceous aromatic compound is anethole, the compound that provides cooling, vapor action is eucalyptol, and the warm, sweet, fruity compound that inhibits bitterness is methyl salicylate. This composition can be used to mask the unpleasant taste of thymol leaving the consumer with a pleasant taste perception. A thymol-containing product including anethole, eucalyptol, and methyl salicylate and a method for masking the taste of thymol are also provided.		

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## TASTE MASKING OF THYMOL

Field of the Invention

This invention relates generally to compositions for masking the medicinal taste of thymol and in particular, to a composition containing at least one sweet and herbaceous aromatic compound, at least one compound that provides cooling, vapor action, and at least one warm, sweet, fruity component that inhibits bitterness for masking the medicinal taste of thymol in a thymol-containing final product.

Background of the Invention

Thymol is a well-known essential oil which is utilized for its antimicrobial activity in a variety of preparations. In particular, thymol can be used in oral hygiene preparations, such as mouth rinses and toothpastes, in sufficient quantities to provide desired beneficial therapeutic effects. Unfortunately, while thymol provides beneficial therapeutic effects, it also provides the consumer with a flavor perception that can be described as unpleasant, harsh or medicinal in taste. A welcome contribution to the art would be compositions containing thymol wherein the unpleasant, harsh or medicinal taste of the thymol has been effectively masked. Such taste-masked compositions would provide the consumer with a pleasant, acceptable taste. Further, such taste-masked compositions would accomplish their end result without resorting to flavoring agents in large quantities having bold flavor notes which may be inharmonious to the overall flavor perception desired in the final product.

A composition containing thymol in which the medicinal taste of thymol is masked is disclosed and claimed in U.S. Patent No. 4,945,087 issued to Talwar et al on July 31, 1990. That patent is directed to compositions containing thymol in which the medicinal taste of thymol is masked by the presence of a sugar alcohol or mixtures of sugar alcohols and anethole.

It would be desirable to provide a composition for masking the medicinal taste of thymol without using a sugar alcohol.

#### Summary of the Invention

Generally speaking, a composition containing at least one sweet and herbaceous aromatic compound, at least one compound that provides cooling, vapor action, and at least one warm, sweet, fruity compound that inhibits bitterness for masking the taste of thymol in an organoleptic product containing thymol is provided. In a preferred embodiment, the sweet and herbaceous aromatic compound is anethole, the compound that provides cooling, vapor action is eucalyptol, and the warm, sweet, fruity compound that inhibits bitterness is methyl salicylate. This composition can be used to mask the unpleasant taste of thymol leaving the consumer with a pleasant taste perception. A thymol-containing product including anethole, eucalyptol, and methyl salicylate is also provided in accordance with the invention.

The products containing thymol in which the taste of thymol is masked in accordance with the present invention include liquid oral preparations such as mouthwash, either in spray or

rinse form, dental cream, toothpaste, tooth powder, tooth gel, and the like and it is understood that the present invention is not limited by the form in which the composition containing thymol and the effective masking agent composition provided in accordance with the invention are used.

The invention accordingly comprises the compositions of matter possessing the characteristics, properties and the relation of constituents and the several steps and the relation of one or more of such steps with respect to each of the others thereof, which will be exemplified in the composition and method hereinafter disclosed, and the scope of the invention will be indicated in the claims.

#### Detailed Description of the Preferred Embodiments

The taste masking compositions provided in accordance with the invention contain at least one sweet and herbaceous aromatic compound, a compound that provides cooling, vapor action, and at least one warm, sweet, fruity component to inhibit bitterness.

The at least one sweet and herbaceous aromatic compound is selected from the group consisting of anethole, star anise, fennel, estragon, and the like. In a preferred embodiment anethole is used.

The anethole is used in an amount between about 0.01% and 1.0% by weight, preferably between about 0.05% and 0.72% by weight. It will be appreciated by those skilled in the art that the threshold level perception of various types of flavoring

agents is different from consumer to consumer; therefore, the level of anethole utilized in the compositions provided in accordance with the invention will either provide a pleasant tasting final composition with minimal to no perceived anethole flavor, or will provide a composition with a mild, pleasant, subtle anethole flavor. Of course, those skilled in the art will also appreciate that higher levels of anethole may be utilized to provide a stronger anethole flavor in accordance with individual taste preference.

The compound that provides cooling, vapor action is selected from the group consisting of eucalyptol, also known as 1,8-cineol, eucalyptus oil, marjoram oil, and mixtures thereof. In a preferred embodiment, the compound that provides cooling vapor action is eucalyptol or 1,8-cineol.

The eucalyptol is used in an amount between about 0.01% and 1.7% by weight, preferably between about 0.04% and 0.60%. The ratio of anethole to eucalyptol is between about 0.1:1 and 1.2:1, preferably between about 0.3:1 and 1.0:1.

The warm, sweet, fruity component that inhibits bitterness is selected from the group consisting of methyl salicylate, ethyl salicylate, wintergreen oil, and mixtures thereof. In a preferred embodiment, this component is methyl salicylate.

The methyl salicylate is used in an amount between about 0.02% and 3.2% by weight, preferably between about 0.09%

and 2.0%. The ratio of methyl salicylate to thymol is between about 0.1:1 and 1.4:1, preferably between about 0.3:1 and 1.1:1.

The finished compositions of this invention may, in addition to the thymol, eucalyptol, and methyl salicylate, include effective amounts of other essential oils such as those selected from the group consisting of camphor oil, peppermint oil, menthol, spearmint oil and the like, and mixtures thereof. Camphor oil has both cooling and antiseptic properties and accentuates the effects of the mint oils. Alternatively, synthetic camphor, camphene, and mixtures thereof may be used in place of some or all of the camphor oil.

Menthol has a physiological cooling effect and enhances the peppermint profile. Cornmint oil, other mint oils, and mixtures thereof may be used in place of some or all of the menthol.

Spearmint oil accentuates freshness and reduces bitterness. Alternatively, 1-carvone may be used in place of some or all of the spearmint oil.

The compositions, as stated above, can contain camphor oil in amounts between about 0.01% and about 0.3% by weight, preferably between about 0.03% and about 0.10%; peppermint oil can be present in amounts between about 2.0% and about 80.0% by weight, preferably between about 6.0% and about 48.0%; menthol can be present in amounts between about 2.0% and about 60.0% by weight, preferably between about 8.0% and about 30.0%; and, spearmint oil can be present in amounts between about 2.0% and

about 80.0% by weight, preferably between about 6.0% and 50.0%; based on the total composition.

The compositions provided in accordance with the invention can also include other components selected from the group consisting of menthone, menthyl acetate, menthyl lactate, neohesperidin dihydrochalcone, and mixtures thereof. The menthone enhances the effect of the peppermint such as freshness. Alternatively, isomenthone, other mint oils and mixtures thereof can be used to replace some or all of the menthone.

Menthyl acetate and menthyl lactate provide a sweet, cooling effect without the bitterness and harshness of menthol. These compounds are, therefore, used to extend the effects of the menthol-type freshness. Other mint oils or a mixture thereof can be used to replace some or all of the menthyl acetate, and 5-ethyl-2-hydroxy-3-methylcyclopent-2-en-1-one can be used to replace some or all of the menthyl lactate.

Neohesperidin dihydrochalcone is a flavor enhancer. Other flavor enhancers such as those selected from the group consisting of maltol, ethyl maltol, vanillin, ethyl vanillin, and mixtures thereof can be used to replace some of all of the neohesperidin dihydrochalcone.

When used, the menthone is present in an amount between about 0.02% and 10.0% by weight; the menthyl acetate is present in an amount between about 0.001% and 2.0% by weight; the menthyl lactate is present in an amount between about 0.002% and 0.01%



by weight; and, the neohesperidin dihydrochalcone is present in an amount between about 0.002% and 0.03% by weight.

The following non-limiting Examples show preparation of taste-masking compositions in accordance with the invention and are presented for purposes of illustration only.

Example 1

Eighteen grams (18g) anethole, 18g eucalyptol, 40g methyl salicylate, 0.3g camphor oil, 4g peppermint, 20g menthol, 0.001g menthone, and 0.002g menthyl acetate were measured and combined at room temperature to produce a taste-masking composition having utility in the preparation of finished products including thymol.

Example 2

Twenty grams (20g) anethole, 4g eucalyptol, 58g methyl salicylate, 0.4g camphor oil, 11g peppermint oil, 1.0g menthyl lactate, 2g menthol, 0.001g menthone, and 0.001g menthyl acetate were measured and combined at room temperature to produce a taste-masking composition having utility in the preparation of finished products including thymol.

Example 3

Twenty-two grams (22g) anethole, 4g eucalyptol, 33g methyl salicylate, 1g camphor oil, 5g peppermint oil, 0.05g menthone, 9g menthol, 0.025g menthyl acetate, 1.2g menthyl lactate, and 22g spearmint oil were measured and combined at room temperature to produce a taste-masking composition having utility in the preparation of finished products including thymol.

Example 4

Twenty grams (20g) anethole, 8g eucalyptol, 28g methyl salicylate, 0.7g camphor oil, 5g peppermint oil, 16g menthol, 1g menthyl lactate, 16g spearmint oil, and 0.003g neohesperidin dihydrochalcone were measured and combined at room temperature to produce a taste-masking composition having utility in the preparation of finished products including thymol.

Example 5

Twenty grams (20g) anethole, 8g eucalyptol, 32g methyl salicylate, 0.3g camphor oil, 4g peppermint oil, 16g menthol, 1g menthyl lactate, and 16g spearmint oil were measured and combined at room temperature to produce a taste-masking composition having utility in the preparation of finished products including thymol.

The taste masking compositions prepared in accordance with the invention are used in finished products containing thymol in an amount between about 0.1% and 0.4% by weight, preferably in an amount between about 0.2% and 0.4%. Even at these levels, thymol has significant desirable beneficial therapeutic effects. However, the flavor perception is often described as unpleasant, harsh or medicinal in taste.

In accordance with the present invention, the unpleasant, harsh or medicinal taste associated with the thymol is masked using anethole, eucalyptol, and methyl salicylate, as described hereinabove. In addition to the essential oils already described, benzoic acid is preferably present in amounts of about

0.1 to about 0.2% by weight, based on the total product and most preferably about 0.13 to about 0.18%

Compositions or final products containing thymol, in which the taste of thymol is masked by the presence of the anethole, eucalyptol, and methyl salicylate in accordance with the invention include liquid oral preparations such as a mouthwash, spray or rinse. In such preparations the vehicle - i.e. the carrier for the ingredients of the mouthwash, such as the essential oils, and the like - is typically a water-alcohol mixture. Generally the ratio of water to alcohol is in the range of from about 1:1 to about 20:1, preferably about 3:1 to about 20:1 and most preferably about 3:1 to about 10:1 by weight. The total amount of water-alcohol mixture in a mouthwash preparation is typically in the range from about 50% to about 99.9% by weight of the composition. The pH value of such mouthwash preparations is generally from about 3.5 to about 8.0 and preferably from about 4 to about 7.5. A pH below 3.5 would be irritating to the oral cavity and soften tooth enamel. A pH greater than 8 would result in an unpleasant mouth feel.

Oral liquid preparations may also contain surface active agents - i.e. surfactants - in amounts up to about 5% and fluorine-providing compounds in amounts up to about 2% by weight of the preparation.

Surface active agents (surfactants) are organic materials which aid in the complete dispersion of the preparation throughout the oral cavity. The organic surface active material

may be anionic, non-ionic, ampholytic, or cationic. Suitable anionic surfactants are water-soluble salts of higher fatty acid monoglyceride monosulfates, such as the sodium salt of the monosulfated monoglyceride of hydrogenated coconut oil fatty acids; higher alkyl sulfates, such as sodium lauryl sulfate; alkyl aryl sulfonates, such as sodium lauryl sulfate; alkyl aryl sulfonates, such as sodium dodecyl benzene sulfonate; higher alkyl sulfonacetates; higher fatty acid esters of 1,2-dihydroxy propane sulfonates; and substantially saturated higher aliphatic acyl amides of lower aliphatic amino carboxylic acids such as those having 12 to 16 carbons at the fatty acid, alkyl or acyl radicals. Examples of the last mentioned amides are N-lauroyl sarcosine, and the sodium potassium, and ethanolamide salts of N-lauroyl, N-myristyl or N-palmitoyl sarcosine.

The non-ionic surfactants employed are poly(oxyethylene)-poly(oxypropylene) block copolymers. Such copolymers are known commercially as poloxamers and are produced in a wide range of structures and molecular weights with varying contents of ethylene oxide and propylene oxide. The non-ionic poloxamers according to the invention are non-toxic and acceptable as direct food additives. They are stable and readily dispersible in aqueous systems and are compatible with a wide variety of formulating ingredients for oral preparations. These surfactants should have an HLB (Hydrophilic-Lipophilic Balance) of between about 10 and 30 and preferably between 10 and 25.

Thus, non-ionic surfactants useful in this invention include poloxamers:

105	188	284
108	215	288
123	217	334
124	234	335
183	235	338
184	237	407
185	238	

Generally these polymers should constitute from 0.2% to 2% by weight of total volume of liquid oral preparation (% w/v) and preferably from 0.5% to 1% w/v. A particularly preferred poloxamer is Poloxamer 407 having an HLB of about 22. Such a polymer is sold under the trademark Pluronic F-127 (BASF-Wyan-Dotte).

Another class of non-ionic surfactants useful in this invention are ethoxylated hydrogenated castor oils. Such surfactants are prepared by hydrogenating castor oil and treating the so-formed product with from about 10 to 200 moles of ethylene glycol. They are designated as PEG (numeral) hydrogenated castor oil in accordance with the dictionary of the Cosmetics, Toiletries and Fragrance Associate, 3rd Ed. wherein the numeral following PEG indicates the degree of ethoxylation, i.e. the number of moles of ethylene oxide added. Suitable PEG hydrogenated castor oils include PET 16, 20, 25, 30, 40, 50, 60, 80, 100 and 200. The ethoxylated hydrogenated castor oils are used in the same concentrations as the above described poly(oxyethylene)-poly(oxypropylene) block copolymers.

Other non-ionic surface active agents which may be suitable include condensates of sorbitan esters of fatty acids with from 20 to 60 moles of ethylene oxide (e.g., "Tweens" a trademark of ICI United States, Inc.), and amphoteric agents such as quaternized imidazole derivatives.

Additional non-ionic surfactants which may be suitable are the condensation products of an alpha-olefin oxide containing 10 to 20 carbon atoms, a polyhydric alcohol containing 2 to 10 carbons and 2 to 6 hydroxyl groups and either ethylene oxide or a heteric mixture of ethylene oxide and propylene oxide. The resultant surfactants are polymers having a molecular weight in the range of 400 to about 1600 and containing 40% to 80% by weight of ethylene oxide, with an alpha-olefin oxide to polyhydric alcohol mole ratio in the range of about 1:1 to 1:3.

Cationic surface active agents which may be suitable are molecules that carry a positive charge such as cetylpyridinium chloride.

Fluorine providing compounds may be present in the oral preparations of this invention. These compounds may be slightly water soluble or may be fully water soluble and are characterized by their ability to release fluoride ions or fluoride containing ions in water. Typical fluorine providing compounds are inorganic fluoride salts such as soluble alkali metal, alkaline earth metal, and heavy metal salts, for example, sodium fluoride, potassium fluoride, ammonium fluoride, cuprous fluoride, zinc fluoride, stannic fluoride, stannous fluoride, barium fluoride,

sodium fluorosilicate, ammonium fluorosilicate, sodium fluoro-zirconate, sodium monofluorophosphate, aluminum mono- and difluorophosphate and fluorinated sodium calcium pyrophosphate.

Alkali metal, tin fluoride and monofluorophosphates such as sodium and stannous fluoride, sodium monofluorophosphate and mixtures thereof are preferred.

In an oral liquid preparation such as a mouthwash, the fluorine providing compound is generally present in an amount sufficient to release up to about 0.15%, preferably about 0.001% to about 0.1% and most preferably from about 0.001% to about 0.05% fluoride by weight of the preparation.

If desired, auxiliary sweeteners may be utilized in the compositions of this invention. Those sweeteners which may be included are those well known in the art, including both natural and artificial sweeteners.

The sweetening agent (sweetener) used may be selected from a wide range of materials including water-soluble sweetening agents, water-soluble artificial sweeteners, water-soluble sweetening agents derived from naturally occurring water-soluble sweeteners, dipeptide based sweeteners, and protein based sweeteners, including mixtures thereof. Without being limited to particular sweeteners, representative illustrations encompass:

A. Water-soluble sweetening agents such as monosaccharides, disaccharides and polysaccharides such as xylose, ribose, glucose (dextrose), mannose, galactose, fructose (levulose), sucrose (sugar), maltose, invert sugar (a mixture of

fructose and glucose derived from sucrose), partially hydrolyzed starch, corn syrup solids, dihydrochalcones, monellin, steviosides, and glycyrrhizin;

B. Water-soluble artificial sweeteners such as the soluble saccharin salts, i.e. sodium or calcium saccharin salts, cyclamate salts, the sodium, ammonium or calcium salt of 3,4-dihydro-6-methyl-1,2,3-oxathiazine-4-one-2,2-dioxide, the potassium salt of 3,4-dihydro-6-methyl-1,2,3-oxathiazine-4-one-2,2-dioxide (acesulfame-K), the free acid form of saccharin, and the like;

C. Dipeptide based sweeteners, such as L-aspartic acid derived sweeteners, such as L-aspartyl-L-aspartyl-L-2,5-dihydrophenyl-glycine, L-aspartyl-2,5-dihydro-L-phenylalanine; L-aspartyl-L-(1-cyclohexenyl)-alanine; and the like;

D. Water-soluble sweeteners derived from naturally occurring water-soluble sweeteners, such as a chlorinated derivative of ordinary sugar (sucrose), known, for example, under the product description of sucralose; and

E. Protein based sweeteners such as thaumatococcus danielli (Thaumatococcus I and II).

In general, an effective amount of auxiliary sweetener is utilized to provide the level of sweetness desired for a particular composition, and this amount will vary with the sweetener selected. This amount will normally be 0.01% to about 40% by weight of the composition when using an easily extractable



sweetener. The water-soluble sweeteners described in category A above, are usually used in amounts of about 5% to about 40% by weight, and preferably in amounts of about 10% to about 20% by weight of the final composition. Some of the sweeteners in category A (e.g., glycyrrhizin) may be used in amounts set forth for categories B-E are generally used in amounts of about 0.005% to about 5.0% by weight of the final composition with about 0.03% to about 2.5% by weight being usual and about 0.003 to about 0.4% by weight being preferred. These amounts may be used to achieve a desired level of sweetness independent from the flavor level achieved from any optional flavor oils used.

The use of the anethole, eucalyptol, and methyl salicylate as discussed above, results in the successful taste masking of the thymol taste. The compositions so masked have a pleasing taste, and, depending on the threshold level of perception of the consumer, may have a pleasing anethole flavor perception. Therefore, additional flavorants or flavors are not necessary; however, if desirable, additional flavorings (flavors) may be added.

The flavorings (flavoring agents) that may be used include those known to the skilled artisan, such as, natural and artificial flavors. These flavorings may be chosen from synthetic flavor oils and flavoring aromatics, and/or oils, oleo resins and extracts derived from plants, leaves, flowers, fruits and so forth, and combinations thereof. Representative flavor oils include: spearmint oil, cinnamon oil, oil of wintergreen

(methyl salicylate), peppermint oil, clove oil, bay oil, eucalyptus oil, thyme oil, cedar leaf oil, oil of nutmeg, oil of sage, and oil of bitter almonds. Also useful are artificial, natural or synthetic fruit flavors such as vanilla, and citrus oil, including lemon, orange, grape, lime and grapefruit and fruit essences including apple, pear, peach, strawberry, raspberry, cherry, plum, pineapple, apricot and so forth. These flavorings may be used individually or in admixture. Commonly used flavors include mints such as peppermint, menthol, artificial vanilla, cinnamon derivatives, and various fruit flavors, whether employed individually or in admixture.

Flavorings such as aldehydes and esters including cinnamyl acetate, cinnamaldehyde, citral, diethylacetal, dihydrocarvyl acetate, eugenyl formate, p-methylanisole, and so forth may also be used. Generally any flavoring or food additive such as those described in *Chemicals Used in Food Processing*, pub 1274 by the National Academy of Sciences, pages 63-258 may be used.

Further examples of aldehyde flavorings include, but are not limited to acetaldehyde (apple); benzaldehyde (cherry, almond); cinnamic aldehyde (cinnamon); citral, i.e., alpha citral (lemon, lime); neral, i.e. beta citral (lemon, lime); decanal (orange, lemon); ethyl vanillin (vanilla, cream); heliotropine, i.e. piperonal (vanilla, cream); vanillin (vanilla, cream); alpha-amyl cinnamaldehyde (spicy fruity flavors); butyraldehyde (butter, cheese); valeraldehyde (butter, cheese); citronellal

(modifies, many types); decanal (citrus fruits); aldehyde C-8 (citrus fruits); aldehyde C-9 (citrus fruits); aldehyde C-12 (citrus fruits); 2-ethyl butyraldehyde (berry fruits); hexenal, i.e. trans-2 (berry fruits); tolyl aldehyde (cherry, almond); veratraldehyde (vanilla); 2,6-dimethyl-5-heptenal, i.e. melonal (melon); 2-6-dimethyloctanal (green fruit); and 2-dodecenal (citrus, mandarin); cherry; grape; mixtures thereof; and the like.

The amount of flavoring employed is normally a matter of preference subject to such factors as flavor type, individual flavor, and strength desired. Thus, the amount may be varied in order to obtain the result desired in the final product. Such variations are within the capabilities of those skilled in the art without the need for undue experimentation. In general, amounts of about 0.05% to about 2.0% by weight of the composition are useable with amounts of about 0.05% to about 1.5% being preferred.

The compositions of this invention may also contain coloring agents or colorants.

The coloring agents are used in amounts effective to produce the desired color. The coloring agents (colorants) useful in the present invention, include the pigments such as titanium dioxide, which may be incorporated in amounts of up to about 2% by weight of the composition, and preferably less than about 1% by weight. Colorants may also include natural food colors and dyes suitable for food, drug and cosmetic

applications. These colorants are known as F.D. & C. dyes and lakes. The materials acceptable for the foregoing spectrum of use are preferably water-soluble, and include indigoid dye, known as F.D. & C. Blue No. 2, which is the disodium salt of 5,5-indigotindisulfonic acid. Similarly, the dye known as Green No. 1 comprises a triphenylmethane dye and is the monosodium salt of 4-[4-N-ethyl-p-sulfobenzylamino)diphenylmethylene]-[1-N-ethyl-N-p-sulfoniumbenzyl)- $\Delta^{2,5}$ -cyclohexadienimine]. Additional examples include the yellow dye, known as D&C Yellow No. 10, and the dye known as F.D. & C. Green N. 3 which comprises a triphenylmethane dye. A full recitation of all F.D & C. and D. & C. dyes and their corresponding chemical structures may be found in the Kirk-Othmer Encyclopedia of Chemical Technology, Volume 5, pages 857-884, which text is accordingly incorporated herein by reference.

The oral compositions of this invention may also be substantially solid or pasty in character such as dental cream, toothpaste, or a toothpowder. Solid or pasty oral preparations contain polishing materials. Typical polishing materials are abrasive particulate materials having particle sizes of up to about 20 microns. Nonlimiting illustrative examples include: water-insoluble sodium metaphosphate, potassium metaphosphate, tricalcium phosphate, dihydrated calcium phosphate, calcium pyrophosphate, magnesium orthophosphate, trimagnesium phosphate, calcium carbonate, alumina, aluminum silicate, zirconium silicates, silica, bentonite, and mixtures thereof. Polishing materials are generally present in an amount from about 20% to

about 82% by weight of the oral preparation. Preferably, they are present in amounts from about 20% to about 75% in toothpaste, and from about 70% to about 82% in tooth powder. For toothpaste and dental creams the water content is about 25% to 50% by weight.

In clear gels, a polishing agent of colloidal silica and alkali metal aluminosilicate complexes are preferred since they have refractive indices close to the refractive indices of gelling agent liquid systems commonly used in dentifrices.

In the oral preparation that are toothpastes, dental creams, or gels the liquid vehicle may comprise water, typically in an amount of about 10-90% by weight of the composition. Polyethylene glycol, propylene glycol, glycerin or mixtures thereof may also be present as humectants or binders in amounts of about 20-25% by weight. Particularly advantageous liquid ingredients comprise mixtures of water with polyethylene glycol or glycerin and propylene glycol. A gelling agent (thickening agent) including natural or synthetic gums such as sodium carboxymethylcellulose, hydroxyethyl cellulose, methyl cellulose and the like may be used, in the range of about 0.5-0.5% by weight. In a toothpaste, dental cream or gel, the liquids and solids are proportioned to form a creamy or gelled mass which is extrudable from a pressurized container or from a collapsible tube.

The toothpaste or gel may also contain a surface active agent which may be an anionic, nonionic or zwitterionic detergent

(surfactant) in amounts of about 0.005-5% by weight. The anionic and nonionic surfactants that are suitable have already been discussed above.

Zwitterionic surface active agents include the betaines and sulfobetaines. Typical alkyl dimethyl betaines include decyl betaine or 2-(N-decyl-N,N-dimethylammonio) acetate, coco betaine, myristyl betaine, stearyl betaine, etc. The amidobetaines similarly include cocoamidoethyl betaine, cocoamidopropyl betaine, lauramidopropyl betaine and the like. These sulfobetaines are similar in structure to the betaines, but have a sulfonate group in place of the carboxylate group, and include alkylsulfobetaines, alkylamidosulfobetaines and alkylaminosulfobetaines.

In general, the compositions of this invention are prepared utilizing techniques well known to those skilled in the art. Thus, the liquid compositions may be prepared by mixing the alcohol soluble ingredients with ethanol, adding a quantity of water to the mixture thus obtained, and then blending or mixing in the water soluble ingredients. For example, in preparing one liter of a typical liquid oral composition, thymol, eucalyptol, menthol, methyl salicylate, anethole, surfactant, and benzoic acid are dissolved in and mixed with ethanol. To this resulting mixture a sufficient quantity of water is added, and then the auxiliary sweetener, water soluble colorants, buffers, and the like are blended in. Then additional water is added to make up one liter.

Those skilled in the art will appreciate that the total amount of all ingredients (components) used in the compositions of this invention equals 100% by weight of the total composition. Also, unless stated otherwise, all percents herein are percent by weight of the total composition.

The following examples are illustrative only and should not be construed as limiting the invention in any way. Those skilled in the art will appreciate that variations are possible which are within the spirit and scope of the appended claims.

Example 6

One-half gram (0.5g) of a thymol taste-masking composition prepared in accordance with Example 1 was added to 95g of a composition containing 0.4g thymol to yield a product composition. The product composition included 0.09% anethole, 0.19% eucalyptol, 0.27% methyl salicylate, 0.001g camphor oil, 0.27g peppermint oil, and 0.27g menthol.

After standing at least 24 hours, the flavor perception of the product composition was evaluated by a trained flavor panel and an untrained flavor panel. Both panels determined that the the thymol taste was effectively masked.

Example 7

Six-tenths gram (0.6g) of a thymol taste-masking composition prepared in accordance with Example 2 was added to 95g of a composition containing 0.3g thymol to yield a product composition. The product composition included 0.09% anethole, 0.11% eucalyptol, 0.34% methyl salicylate, 0.002g camphor oil,

0.35g peppermint oil, 0.006g menthyl lactate, and 0.18g menthol.

The flavor perception of this formulation was tested by flavor panels as described in Example 6 and revealed that the thymol taste was effectively masked.

#### Example 8

Forty-six-hundreths gram (0.46g) of a thymol taste-masking composition prepared in accordance with Example 3 was added to 95g of a composition containing 0.4g thymol to yield a product composition. The product composition included 0.10% anethole, 0.10% eucalyptol, 0.32% methyl salicylate, 0.004g camphor oil, 0.3g peppermint oil, 0.006g menthyl lactate, 0.10g spearmint oil, and 0.14g menthol.

The flavor perception of this formulation was tested by flavor panels as described in Example 6 and revealed that the thymol taste was effectively masked.

#### Example 9

Six-tenths gram (0.6g) of a thymol taste-masking composition prepared in accordance with Example 4 was added to 95g of a composition containing 0.3g thymol to yield a product composition. The product composition included 0.12% anethole, 0.12% eucalyptol, 0.36% methyl salicylate, 0.004g camphor oil, 0.36g peppermint oil, 0.43g menthol, 0.006g menthyl lactate, and 0.10g spearmint oil.

The flavor perception of this formulation was tested by flavor panels as described in Example 6 and revealed that the thymol taste was effectively masked.



Example 10

Six-tenths gram (0.6g) of a thymol taste-masking composition prepared in accordance with Example 5 was added to 95g of a composition containing 0.3g thymol to yield a product composition. The product composition included 0.12% anethole, 0.19% eucalyptol, 0.38% methyl salicylate, 0.002g camphor oil, 0.22g peppermint oil, 0.27g menthol, 0.006g menthyl lactate, and 0.01g spearmint oil.

The flavor perception of this formulation was tested by flavor panels as described in Example 6 and revealed that the thymol taste was effectively masked.

It will therefore be seen that the goal of masking the unpleasant taste perception of thymol is efficiently attained and, since certain changes may be made in the described compositions, and in the construction set forth, without departing from the spirit and scope of the invention, it is intended that all matter contained in the above description shall be interpreted as illustrative and not in a limiting sense.

It is also to be understood that the following claims are intended to cover all of the generic and specific features of the invention herein described and all statements of the scope of the invention which, as a matter of language, might be said to fall therebetween.

Particularly, it is to be understood that in said claims, ingredients or compounds recited in the singular are

intended to include compatible mixtures of such ingredients wherever the sense permits.

## WHAT IS CLAIMED IS:

1. A taste-masking composition for masking the taste of thymol in an organoleptic product comprising an effective amount of at least one sweet and herbaceous aromatic compound, at least one compound that provides cooling, vapor action, and at least one warm, sweet, fruity component that inhibits bitterness and wherein the ratio of the at least one sweet and herbaceous compound to the at least one compound that provides cooling, vapor action is between about 0.1:2 and about 1.2:1 and wherein the ratio of the at least one sweet and herbaceous compound to the at least one warm, sweet, fruity component that inhibits bitterness is between about 1:5 and about 1:3.

2. The taste-masking composition of claim 1 wherein the at least one sweet and herbaceous compound is selected from the group consisting of anethole, star anise, fennel, estragon, and mixtures thereof.

3. The taste-masking composition of claim 1 wherein the at least one sweet and herbaceous compound is anethole.

4. The taste-masking composition of claim 1 wherein the at least one compound that provides cooling, vapor action is selected from the group consisting of eucalyptol, eucalyptus oil, marjoram oil, and mixtures thereof.

5. The taste-masking composition 1 wherein the at least one compound that provides cooling, vapor action is eucalyptol.

6. The taste-masking composition of claim 1 wherein

the warm, sweet, fruity component that inhibits bitterness is selected from the group consisting of methyl salicylate, ethyl salicylate, wintergreen oil, and mixtures thereof.

7. The taste-masking composition of claim 1 further including at least one additional component selected from the group consisting of camphor oil, peppermint oil, menthol, spearmint oil, and mixtures thereof.

8. A taste-masked composition containing thymol in an amount between about 0.1% and 0.4% by weight and an effective amount of at least one sweet and herbaceous aromatic compound, at least one compound that provides cooling, vapor action, and at least one warm, sweet, fruity component that inhibits bitterness and wherein the ratio of the at least one sweet and herbaceous compound to the at least one compound that provides cooling, vapor action is between about 0.1:2 and about 1.2:1 and wherein the ratio of the at least one sweet and herbaceous compound to the at least one warm, sweet, fruity component that inhibits bitterness is between about 1:5 and about 1:3.

9. The taste-masked composition of claim 8 wherein the at least one sweet and herbaceous aromatic compound is anethole.

10. The taste-masked composition of claim 8 wherein the at least one compound that provides cooling, vapor action is eucalyptol.

11. The taste-masked composition of claim 8 wherein the at least one warm, sweet, fruity component that inhibits bitterness is methyl salicylate.

12. The taste-masked composition of claim 8 wherein the composition is a liquid oral preparation.

13. The taste-masked composition of claim 8 wherein the composition is a dental cream.

14. The taste-masked composition of claim 8 wherein the composition is a toothpaste.

15. The taste-masked composition of claim 8 wherein the composition is a toothpowder.

16. The taste-masked composition of claim 8 wherein the composition is a gel.

17. A method of masking the taste of thymol in a composition including between about 0.1% and 0.4% by weight thymol comprising adding an effective amount of at least one sweet and herbaceous aromatic compound, at least one compound that provides cooling, vapor action, and at least one warm, sweet, fruity component that inhibits bitterness and wherein the ratio of the at least one sweet and herbaceous compound to the at least one compound that provides cooling, vapor action is between about 0.1:2 and about 1.2:1 and wherein the ratio of the at least one sweet and herbaceous compound to the at least one warm, sweet, fruity component that inhibits bitterness is between about 1:5 and about 1:3.

18. The method of masking the taste of thymol of claim 17 wherein the at least one sweet and herbaceous aromatic compound is anethole.

19. The method of masking the taste of thymol of claim 17 wherein the at least one compound that provides cooling, vapor action is eucalyptol.

20. The method of masking the taste of thymol of claim 17 wherein the at least one warm, sweet, fruity component that inhibits bitterness is methyl salicylate.

## INTERNATIONAL SEARCH REPORT

International application No.  
PCT/US96/12195

**A. CLASSIFICATION OF SUBJECT MATTER**

IPC(6) :A23L 1/22

US CL :426/533

According to International Patent Classification (IPC) or to both national classification and IPC

**B. FIELDS SEARCHED**

Minimum documentation searched (classification system followed by classification symbols)

U.S. : 426/533, 534; 424/049; 514/901, 974

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US, A, 4,945,087 (TALWAR ET AL) 31 July 1990, entire patent.	1-20

☐ Further documents are listed in the continuation of Box C. ☐ See patent family annex.

* Special categories of cited documents:	"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"A" document defining the general state of the art which is not considered to be of particular relevance	"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
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"P" document published prior to the international filing date but later than the priority date claimed	

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26 SEPTEMBER 1996

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16 OCT 1996

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